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Some North Dakota Hypocreales

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For some time past the writer has been engaged in the preparation of a monograph of the North American Hypocreales and the year spent in North Dakota, in the employ of the North Dakota Agricultural College, afforded a fair opportunity for the study of the various species of this order in that particular locality. While the work on the local fungi of that state was not limited to the order treated here, an especial effort was made to accumulate as much material of this order as possible. All of the species reported here were collected in the summer and autumn of 1907 and the spring of 1908. Most of the material was collected near Fargo, in the extreme eastern part of the state, but several specimens were obtained at Hawk's Nest, a low range of hills near the central part of the state, the ravines of which are shaded by a considerable growth of forest trees.

North Dakota, being essentially a prairie state and having its timbered regions limited to narrow belts along the rivers, lakes, and ravines in mountainous districts, does not afford the most favorable conditions for the growth of those forms of fungi which thrive best in moist shaded places. But notwithstanding the unfavorable conditions, the season spent in work on the fungus flora of this state was rewarded with a surprisingly large number of the saprophytic forms, while parasitic fungi which occur in more open regions were found to be most abundant.

The order Hypocreales is represented by approximately two hundred species in the whole of North America, and it would not be expected that a large number of species of a single order of this size would be collected in a given locality during one season. The list is published at this time, not on account of the large number collected, but to add to the knowledge of the distribution of this order in North America, and since there is little published work on the fungi of North Dakota, it is hoped the list will be of interest to some.

Of the twenty species reported here one at least deserves especial mention. *Nectria tuberculariformis* (Rehm) Winter was collected in the autumn of 1907 on herbaceous stems and one specimen was found in full fruit on the bark of a dead branch. No specimen of this species had previously been seen in the collection of North American Hypocreales examined and up to the present time no record of it from North America has been seen. During the spring of 1908 a quantity of the material was collected on dead stems of nettle, on which host the species has been reported in Europe. The species, while a true stromatic *Nectria*, is specifically very distinct from any of the other forms of the genus that have been examined. The stroma is tubercular, very distinct in outline, and rounded or more often elongated. The perithecia are small and instead of being cespitose on the stroma so as to cover it almost completely, as is usually the case, they are entirely superficial and distributed over its surface, being often scattered but occasionally crowded. The species is of interest not only on account of its distribution but for its peculiar specific characters.

The identification of the species recorded here has been facilitated by access to the collections of the New York Botanical Garden, with its numerous types, as well as by the types that have been received from individuals during the course of the work on the order.

Synopsis of the genera

Perithecia free on the substratum, or entirely superficial on a sessile stroma.

Perithecia dark blue with transmitted light (nearly black to the naked eye), spores with 3 or more septa.

I. GIBBERELLA.

Perithecia normally bright colored, of some shade of red, yellow, or brown (often becoming dark with age).

Spores 2-celled.

II. NECTRIA.

Spores muriform.

III. PLEONECTRIA

Perithecia more or less immersed in a common matrix, varying from a cottony subiculum to a distinct fleshy stroma.

Matrix consisting of a cottony subiculum in which the perithecia are seated, usually growing on other fungi; spores fusiform.

IV. HYPOMYCES.

Matrix consisting of a distinct fleshy stroma, sessile or erect; spores filiform or subglobose.

Asci 16-spored (by the breaking of each spore into two); spores subglobose; stroma sessile (very rarely erect).

V. HYPOCREA.

Asci 8-spored; spores filiform, nearly as long as the ascus; stroma erect (very rarely subsessile).

Stroma springing from a sclerotium formed in the ovaries of plants.

VI. CLAVICEPS.

Stroma springing from the bodies of dead insects, larvae, or underground fungi.

VII. CORDYCEPS.

I. GIBBERELLA

GIBBERELLA PULICARIS (Fries) Sacc. Very common on old corn-stalks about Fargo. This fungus is reported to have as its conidial phase species of *Fusarium*. The mature fruit appears on dead materials and its connection with a *Fusarium* suggests a possibility of its association with plant diseases. The life-history of this plant should be more carefully studied.

II. NECTRIA

a. Perithecia solitary and free on substratum.

NECTRIA PEZIZA (Tode) Fries. This is one of the most common of the non-stromatic forms of *Nectria* and occurs on various kinds of dead materials. It is perhaps most common on decayed wood but is often found on old fungi and one very good specimen was collected in North Dakota on a piece of old burlap sacking. The species is characterized by the rather large nearly globose perithecia which collapse when dried so as to resemble a small *Peziza*, for which the species has often been mistaken. The spores also are characteristic, being broadly elliptical and non-constricted. Various collections were made at Fargo and Hawk's Nest.

NECTRIA EPISPHAERIA (Tode) Fries. On various kinds of sphaeriaceous fungi. The species is distinguished from *Nectria sanguinea* Bolton by its occurrence in this kind of a habitat. The forms occurring on fungi show a strong tendency to collapse from the two opposite sides, which tendency, although less common, is not entirely lacking in young specimens of *Nectria sanguinea* Bolton. It is thought doubtful if the two are specifically distinct. Both are characterized by the blood-red color of the perithecia.

b. Perithecia borne on a stroma, often cespitose.

NECTRIA COCCINEA (Pers.) Fries. Several specimens on dead branches in woods near Fargo. The species is distinguished by the scarlet-red perithecia, borne in clusters on a yellowish stroma.

NECTRIA PURPUREA (L.) Wilson & Seaver.

Nectria cinnabarina (Tode) Fries.

On dead branches of various kinds of trees and shrubs. The mature fruit of this plant occurs on dead branches and usually in great abundance, but its conidial phase is reported to be parasitic. The species is recognized by the rough perithecia, which vary in color from rather bright cinnabar-red to dull brownish black and are borne in dense clusters on a tubercular stroma.

NECTRIA VERRUCOSA (Schwein.) Sacc. On dead branches in woods near Fargo. The perithecia and spores of this species are identical with those of the preceding. The species is distinguished by the fact that the stroma is depressed, never rising above the surface of the bark, while in the preceding it is tubercular and very prominent.

NECTRIA TUBERCULARIFORMIS (Rehm) Winter ; Rabenh. Krypt. Flora **1**²: 118, 119. 1887.

Hypocrea tuberculariformis Rehm, Ber. Naturh. Ver. Augsburg **26**: 106. 1881.

Exsicc. : Rehm, Ascom. 435, 679.

Other specimens examined : N. Dakota, *Seaver*, various collections.

Habitat : Herbaceous stems (especially *Urtica* sp.), bark, and dung.

Stroma tubercular, rounded or more usually elongated, nearly smooth or in dried specimens often longitudinally striated, pinkish or rose-colored, becoming dull red with age.

Perithecia superficial, solitary or more or less crowded, small, averaging about 200μ in diameter, smooth or nearly so, globose with a rather prominent ostiolum, delicately rose-colored, becoming slightly collapsed from above when dry ; asci clavate, 8-spored, about $40-50\mu \times 6-7\mu$; spores 1- or 2-seriate, mostly 2-seriate above and 1-seriate below, usually a little broader above, fusoid, and a little constricted at the septum, with two or more small oil-drops in each cell, $8-11\mu \times 3-4\mu$.

The conidial phase is often very abundant but the mature fruit is less common.

III. PLEONECTRIA

PLEONECTRIA BEROLINENSIS Sacc. On dead branches of red currant in the Agricultural College Gardens and also on branches

of wild black currant in woods near Fargo. Very destructive to currants in cultivation. In external appearance the plants of this species very closely resemble those of *Nectria purpurea* (L.) W. & S. but the species is very distinct in the spore characters. The spores instead of being 2-celled are divided both longitudinally and transversely into numerous cells.

IV. HYPOMYCES

HYPOMYCES AURANTIUS (Pers.) Fuckel. On decaying fungi of various kinds. Various collections, Fargo and Hawk's Nest. The fungus presents to the naked eye a rusty red appearance due to the cottony stroma, which spreads over the substratum often for several inches. Closer examination will show the orange-colored perithecia scattered over the stroma. The species is rather common.

HYPOMYCES LACTIFLORUM (Schwein.) Tul.

Hypomyces purpureus Peck.

On some agaric in woods near Fargo. The stroma of this plant, which entirely covers the hymenium of the host infected, presents an orange-yellow color. Scattered over the orange surface are the perithecia, which are nearly immersed, with necks protruding. As the plants of the host decay, they become purple, which accounts for the specific name of the synonym given above. The species was found to be abundant in one locality.

HYPOMYCES OCHRACEUS (Pers.) Tul. On some agaric in same locality as preceding. The plants differ from the preceding by the fact that the stroma is almost entirely white when fresh, becoming yellowish as it dries. There is also a marked difference in the spores.

HYPOMYCES POLYPORINUS Peck. On old plants of *Coriolus versicolor*, in woods near Fargo. The plants of this species occur on the under surface of the host and would scarcely be seen except by accident or special search. Characterized by the amber color of the perithecia and the habitat as well as by spore characters. Found in considerable abundance. I am indebted to Professor C. H. Peck for an authentic specimen of this species for comparison.

HYPOMYCES ROSELLUS (Albert. & Schwein.) Tul. Several collections on the under side of rotten logs in woods near Fargo.

The species is well marked by the delicate rose color of the subiculum and perithecia as well as by spore characters.

V. HYPOCREA

HYPOCREA CITRINA (Pers.) Fries. On dead limbs of basswood, especially where the outer bark has been removed. Plants form a bright lemon-yellow stroma, often several inches in extent on the substratum. The perithecia are seen as little dots over the surface of the stroma. The plants resemble those of the preceding genus but are readily distinguished by the spore characters. Considerable quantity of this material has been collected but always on the same host.

HYPOCREA PATELLA Peck. The stroma in this species is very small as compared with the preceding and not so bright-colored. In the specimens of this species collected, it seems to show a tendency to grow on old sphaeriaceous fungi. This has been compared with specimens identified by Professor Peck.

HYPOCREA RICHARDSONI Berk. & Mont. Very common on limbs of *Populus tremuloides* in woods near Fargo. No perithecia have been seen in any of the specimens which have been examined. Although in external appearance the plants resemble a *Hypocrea*, it is doubtful if they rightfully belong to this genus.

HYPOCREA RUFA (Pers.) Fries. The specimens which were collected in Fargo were small and not fair examples of this species, but they seem to belong here.

VI. CORDYCEPS

CORDYCEPS MILITARIS (L.) Link.

Isaria farinosa Fries.

On larvae of insects in Fargo woods. Only the conidial phase of this plant was collected in North Dakota but that occurred in considerable abundance and doubtless the mature fruit would have appeared at the proper season. The conidial phase is characterized by the snow-white feather-like growth, with its yellowish stem which springs from larvae that are buried under leaves and soil.

CORDYCEPS PISTILLARIAEFORMIS Berk. & Broome. On scale-insects on branches of *Xanthoxylum americanum* in woods about Fargo. The plants of this species collected do not show mature

asci and spores but otherwise correspond well with other specimens of this species that have been examined.

VII. CLAVICEPS

CLAVICEPS PURPUREA (Fries) Tul. The species was collected by the writer on several hosts including *Bromus*, *Agropyron*, and cultivated rye, in the Agricultural College grounds. The fungus is a parasite and besides causing some reduction in the crop is also the cause of a characteristic disease among cattle. It is used as an official drug under the name of ergot.

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